FACTOR AFFECTING THE DECISION ENVIRONMENT

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Project Organization: Factors Affecting the Decision Environment[1]

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This paper presents some of the initial findings of a study designed to detail the relationships among situational, structural, and process variables as they relate to project effectiveness. The emphasis of this paper is upon investigating the project organization and decision making environmental variables as they relate to project success. The overall study was conducted by the School of Management, Boston College, and sponsored by the National Aeronautics and Space Administration.

The overall study is believed to be the largest and most comprehensive investigation to date on the subject of project management effectiveness. A sample of 646 responses to a 17 page questionnaire represented a variety of industries (34% manufacturing, 22% construction, 17% government, and 27% services, transportation and others). Most of the respondents themselves had been directly involved in the particular project they chose to describe in their questionnaire. Of the total sample, 50% had been the project manager, 31% had been in other positions on the project team, and another 10% had been the project manager's direct superior. About one-third of the projects were described as being public in nature, the remaining two-thirds being in the private sector. The types of contracts or agreements involved included cost plus fixed fee (32%) in-house work orders (28%), fixed price (21%), and fixed price with incentives (14%). The major activity or end product involved in the projects included construction (43%), hardware or equipment (22%), new processes or software (14%), and studies, services and tests (11%).

The data were analyzed in several ways:

First, product-moment correlations were performed on the project characteristics with six success items. These

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correlations indicated linear relationships of the project characteristics with the success items. It was found that the overall subjective item--"All things considered, the project was a success"--presented a fair overall measure of success.

Next, in order to simplify the data and to enhance the understanding of the project characteristics, a factor analysis was performed on the variables describing each project. While the correlations allow us to study the relationships of specific items or project characteristics, factor analysis allows us to move a step closer toward understanding the total pattern of relationships among all of the variables. Factor analysis is a statistical technique which can analyze the relationships between any number of variables and produce a set of "factors" or underlying dimensions--each representing an interrelated "cluster" of the original variables. Thus when, say, five variables tend to "travel together" they are "boiled down" to a single factor for analysis purposes. This has the important advantage of reducing the number of variables to be studied.

One of the factors which emerged in the factor analysis provided us with a measure of project success. This factor, which we called "Perceived Success of the Project," was comprised of the following individual questionnaire items:

Item	Factor Loading
Satisfaction with outcome - client	.734
Satisfaction with outcome - parent	.701
Satisfaction with outcome - project team	.683
Project was a success	.678
Satisfaction with outcome - end users	.670
Technical adequacy of end result	.588

A total of thirty-three other identifiable and distinct factors were derived from the variables. Each of the factors was correlated with the factor, "Perceived Success of the Project."

In order to identify any non-linear relationships among the factors and perceived success or failure, an F-test analysis of variance was performed on the factors with success items categorized by degree.

In addition, a path analysis diagram was constructed based upon a series of multiple regressions.

Some of the results run counter to traditional practice. Some can be considered counter-intuitive in nature. A few of the findings which may be considered to fall into these types of categories are presented below. In each case, a

statement is presented which the reader is asked to declare as true or false before proceeding.

> A matrix form of project organizational structure is the least disruptive to traditional company functional organizational patterns and is also most likely to result in project success.

False. Although there are no clear definitions of the different forms of project organizational structures which have attained widespread acceptance, there are some terms which imply certain patterns. The matrix form of organization is well understood by experienced project management personnel but the authority which goes with such a matrix form of structure varies considerably. In order to provide a spectrum of choices which attempted to avoid preconception of terms, the following organizational patterns were presented for describing the organizational structure of the project team as it existed during the peak activity period of the project:

- Pure Functional-Project Manager, if any, was merely the focal point for communications, he had no authority to direct people other than by persuasion or reporting to his own superior.

- Weak Matrix-Project Manager was the focal point for controls; he did not actively direct the work of others.

- Strong Matrix or Partially Projectized-Project Manager was the focal point for directions and controls; he may have had some engineering and control personnel reporting to him on a line basis, while remainder of the Project Team was located administratively in other departments.

- Projectized-Project Manager had most of the essential elements of the Project Team under him.

- Fully Projectized-Project Manager had almost all of the employees who were on the Project Team under him.

An F-test of these different forms of organizational structure compared with project success revealed that the projectized form of organizational structure was most closely associated with success. Therefore, it is important for the project manager to have most of the essential elements of the project team under him.

The question remains, however, how should the decision making authority of the project manager relate to the decision making authority of the client organization (the organization which sponsored, approved, and funded

the effort), and the parent organization (the organization structure above the level of the project manager but within the same overall organization)?

> When a project is critical to the overall success of a company and/or it is critical to the client organization, the parent organization and/or the client organization should take a strong and active role in internal project decision making.

False. It is important for the client organization to establish definitive goals for a project. Similarly, and especially for in-house projects, the parent organization must also establish clear and definitive goals for the project. When there is a good consensus among the client organization, the parent organization, and the project team with respect to the goals of a project, then success is more readily achieved. A path analysis revealed that success criteria clarity and consensus were especially important for:

- projects with complex legal/political environments,
- projects which are relatively large, and
- projects undertaken within a parent organization undergoing considerable change.

Once success criteria have been clarified and agreed upon by the principal parties involved with a project, i.e., the client, the parent, and the project team, then it is essential to permit the project team to "carry the ball" from there on out with respect to internal decisions.

Because some decisions require the approval of the client organization, it was found that the authority of the client contact should be commensurate with the authority of the project manager. Projects characterized by strong project manager authority and influence and strong client contact authority and influence were strongly associated with success. Unfortunately, many client organizations and parent organizations tend to believe that the more closely they monitor a project and the more intimately they enter into the internal project decision process, the more likely the project will be successful. Close coordination and good relations patterns were found to be the most important factors contributing to project success. Nonetheless, there is a very important distinction between "close" and "meddling" and there is just as important a distinction between "supportive" and "interfering" relationships. Many factors and relationships pointed to the need for the client and the parent organization to develop close and supportive working relationships with the project team but to avoid meddling or interfering with the project

team's decision making processes. The lesson is clear: the project manager should be delegated sufficient authority to make important project decisions and sufficient authority to direct the project team.

Once given this authority, how should the project manager arrive at decisions and solve problems?

Because participative decision making and problem solving can tend to slow up the decision making and problem solving processes, these behavioralistic approaches should not be employed on complex, crash projects.

False. First of all, participative decision making and problem solving within the project team was highly correlated with success for the total sample of projects. Second, a path analysis revealed that under conditions of adversity, such as a highly complex project, or one where initial overoptimism prevailed regarding the time and cost for completing the project, it was especially important to employ participative approaches to overcome these adversities.

If this pattern is successful, should the public also participate in project decisions affecting the public interest?

Public participation is an essential ingredient of success for projects affecting the public interest.

False. Although the trend of the past eight to ten years has certainly been in this direction, i.e., to encourage, or at least to facilitate, public participation in the decision making process for public projects, and although value judgment may lean heavily toward this approach, the facts are that public participation delays and hampers projects and reduces the probability of success.

Therefore, from a management standpoint (not from a value judgment standpoint), public participation should be avoided or circumvented as much as possible.

If public participation hampers success, can the cooperation and participation of several agencies help to safeguard the public interest and result in a more successful overall effort than a project undertaken by a single agency?

Public projects involving the cooperation, funding, and participation of several governmental agencies are more likely to be successful than projects undertaken by a single agency.

False. Again, the trend is certainly in this direction. There has been a great deal of emphasis upon:

- inter-agency cooperative efforts, e.g., Departments of Labor, Commerce, and Transportation;
- inter-governmental cooperative efforts, e.g., Federal, state, and local jointly funded efforts.
- the creation of new, integrative agencies, e.g., regional commissions combining the efforts of several states, counties, or cities to attack common problems.

Although the creation of these jointly-funded, jointly-managed organizational mechanisms may be desirable from the standpoint of integration of efforts, they tend to result in less successful projects as compared to projects undertaken by a single source of funding and authority. Such cooperative efforts result in the creation of elaborate bureaucratic structures, decision delays, red tape, and relatively diminished success.

What types of project tools contribute to better project decisions and relatively greater project success?

The use of PERT-CPM systems is the most important factor contributing to improved decision making and project success.

False. PERT-CPM systems do contribute to project success, especially when initial over-optimism and/or a "buy-in" strategy has prevailed in the securing of the contract, but the importance of PERT-CPM is far outweighed by another factor involving project tools entitled, "systems management concepts." This factor included the use of, and value of, work breakdown structures, life cycle planning, systems engineering, configuration management, and status reports. The over-use of PERT-CPM systems was found to hamper success. It was the judicious use of PERT-CPM which was associated with success.

As stated earlier, some of these findings run counter to traditional project management practice and some may be considered counter-intuitive.

When establishing organizational structures and decision making patterns for a project the following guidelines should be kept in mind:

- Design a projectized form of organizational structure.
- Delegate sufficient authority to the project manager for internal project decisions and to the principal client contact for decisions requiring client organization approval.
- A project manager should seek to maximize his influence and to employ participative approaches to problem solving and decision making.
- Avoid or minimize public participation.

- Seek to establish single agency funding and direction for public projects.
- Avoid pre-occupation with, or over reliance upon PERT-CPM.

These guidelines alone cannot assure project success, they can only contribute to it. Another aspect of the study has shown that there are:

- twenty-nine project management characteristics which strongly affect the perceived failure of a project,
- twenty-three project management characteristics which are strongly associated with perceived success of a project, and
- ten project management characteristics linearly related to both perceived success and perceived failure.

It is not generally possible to include all the characteristics which contribute to success nor to exclude all those which affect failure. Where a choice exists, however, it is important to know which choice will contribute to project success and/or which choice will contribute to project failure. This study contributes to a better understanding of how to make those choices.